

## **Roadmap for Development of Environmental Indicators to Track Population Trends of Birds Associated with Agroecosystems**

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Currently, Government Performance and Result Act (GPRA) outcome measures for the Office of Pesticide Programs are based on the total amounts of highly toxic pesticides that are applied to crops. Quantity of pesticide use as a sole measure is limited because it does not directly reflect the actual impacts of pesticides on the ecosystem or its components, such as bird populations. Pesticide use measures the potential for risk, but not the ultimate outcome of the status of bird populations in the field. The use of correlating an increase in the number of bald eagle nests with the reduction of environmental contaminants within the Great Lakes Region (ROE, 2003, p. 3-13) is an example of how birds have been used as indicators for monitoring the health of the environment.

OPP recently completed an environmental benefit assessment on *Bt* cotton and found a significant correlation between the reduction in insecticide use and increases in bird populations. Cotton has experienced a very large reduction in conventional insecticide usage as use of *Bt* cotton has increased. This study used bird population data from the USGS's North American Bird Breeding Survey (BBS), *Bt* cotton adoption rates, and species normally found in cotton fields. Statistically significant correlations were found between the increase in bird counts and the reduction in insecticide use, and to a lesser extent, the *Bt* adoption rate and the percent of the species found in cotton fields. The analysis is suggestive of a cause-and-effect relationship. Additional analyses were conducted to examine relationships at the county level. Biodiversity estimates were calculated and trends within ecoregions enabled comparison of bird populations across a region to differing levels of *Bt* cotton.

The next work integrated geographic data sets from the Institute for Bird Populations, National Land Cover, and BBS. The results show that the most comprehensive data exist for the corn belt. A new registration for *Bt* corn controls corn rootworm control, which has the potential to significantly decrease future insecticide use and therefore provides a baseline opportunity to examine the sensitivity of bird population data to reflect insecticide changes.

The results of this study and future extensions will be integrated with the economic value of bird population changes in order to provide a comprehensive assessment of the impact of regulatory decisions. The work will build on an avian valuation database created by OPP and OPEI, avian indicators under development, and information systems on land use. Partnerships with the following organizations will be sought as this project progresses: USGS's Patuxent Wildlife Research Center, the Institute of Bird Population, the National Audubon Society, the Great Lakes Environmental Indicator Project (GLEI), the Cornell Laboratory of Ornithology, the Terrestrial Environmental Risk Indicator (TERI) activity of the OECD Pesticide Risk Reduction Steering Group, the Natural History Museum, University of Kansas, and the National Ecological Observatory Network.